Behavior competence development through e-learning: experience at the undergraduate level in the context of Aula a Distancia Abierta (ADA) Madrid, Spain

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Abstract

This communication presents the results of an innovative approach for competence development suggesting a new methodology for the integration of these elements in professional development within the ADA initiative (*Aula a Distancia Abierta*, Distance and Open Classroom) of the Community of Madrid. The main objective of this initiative is to promote the use of Information and Communication Technologies (ICTs) for educational activities by creating a new learning environment structured on the premises of commitment to self–learning, individual work, communication and virtual interaction, and self and continuous assessment. Results from this experience showed that conceptualization is a positive contribution to learning, as students added names and characteristics to competences and abilities that were previously unknown or underestimated. Also, the diversity of participants' disciplines indicated multidimensional interest in this idea and supported the theory that this approach to competence development could be successful in all knowledge areas.

Keywords: Distance education; competence, training, e-learning

1. Competence development and the European Higher Education Area

The existence of the European Higher Education Area – developed after a series of commitments made by European national governments through their ministries of education - seeks to achieve two strategic objectives: employment growth and conversion to the European training system by students and teachers around the world. This process has led to the transformation of national university education and training systems by integrating the concept of competencies as a key element to provide an education that enhances employability, competitiveness and human mobility in the European context (European Commission, 1999).

The competence paradigm's, main element is highly complex. This is reflected in the concept variations that can be found within the context and in particular areas, where applicable. Within the multiple concepts of competence available in academic literature, there are two essential elements that appear as constant variables: (1) the "capacity" of combining knowledge, skills and experience, and (2) what Mulder (2007) called "authority" - linked to the concept of the responsibility to act or exercise. An example of this conceptual diversity may include:

"A dynamic combination of attributes, in relation to knowledge, skills, attitudes and responsibilities, which describe the learning outcomes of an educational program or what students are able to demonstrate at the end of an educational process" (University of Deusto);

"Competence: integrated set of skills, knowledge, abilities, attitudes and behaviors that people place into play to perform in different organizations and work settings." (Schkolnik & et al, 2005); and

"Competence is a construct, the result of an appropriate mix of various resources (knowledge, information networks, networks of relationships, know-how) (Mulder, 2007).

While some authors suggest that competencies have a conceptual base and are basically developed through experience (Mulder, 2007; Schkolnik & et al, 2005) others, such as Aguado and Arranz (2005), argue that the development of these elements must be understood as a process that consists of two parts – (1) the acquisition of theoretical knowledge and (2) the integration of different types of knowledge (i.e. practical, experiential) so that individuals are able to function in all relevant life situations.

The same scenario applies to the most relevant skills required to achieve full personal and social development. Endless combinations of professional profiles are sought. Similarly, approaches to encourage competence development pose an additional challenge for higher education to design and implement new ways to achieve the objective of integrating this element to professional education.

2. E-learning: The Use of Information Technologies and Communication Technology (ICTs) for learning

The use of new technologies in the learning processes has been conceptualized in what is known as e-learning. E-learning involves using an instrument that complements the initial formation and training processes. Its origins are derived from the technological evolution of what is known as "distance learning". This concept was developed decades ago in response to the need to reach a greater number of potential students who could not access training sessions because they lacked resources including financial, temporal or space. (Planella & Rodriguez, 2004, Aguado & Arranz, 2005, Shin, Feng, & Tsai, 2008).

E-learning is defined as the combination of an electronic element, usually a computer, and a learning technique for the development of new knowledge and/or skills, individually or collaboratively (Liu and Hwang, 2010).

Its main features can be summarized in three elements: 1) temporal and spatial flexibility, 2) asynchronous interaction between teachers and students or among students, and 3) a wide variety of applicable technological resources employed to enhance learning. When comparing the characteristics between virtual and classroom training, Cabrero (2006) highlights the flexible character of the learning process, the active knowledge construction, and the greater availability of pedagogical tools in the virtual environment.

The introduction of ICTs generates a change in the physical environment in which it is developed and in roles (Paulson, 2002; Jara & Mello, 2010). With regard to in-class training, the teacher is the learning engine. In the virtual environment, the student's individual approach to learning has greater weight and a greater influence on educational outcomes. When discussing new roles. Meyer (2002) suggests that students developed through the network must possess the following seven characteristics that directly impact learning results: motivation, independence, self reliance, self-efficacy, openness, mastery of certain techniques required for intellectual work (such as independent study), and the capability and desire to participate in collaborative learning.

This human factor is highlighted by several authors as a differentiator of performance and utility of this instrument. These authors suggest that the design of e-learning tools should consider the potential student's profile in order to generate a effective interface and useful knowledge according to the user profile (Penna, Stark, & Puliti, 2006; Au & Sadiq, 2009; Liaw, Huang, & Chen, 2007, Lu & Chiou, 2010).Pedagogical strategies generated for this context are in constant evolution and are closely linked to the development of new technological tools and to the particular requirements of the students being trained.

Virtual learning has two main learning strategies: individual and cooperative. The individual strategy aims to deliver and integrate specific knowledge for the beneficiary. The cooperative strategy promotes interaction - in addition to transmitting knowledge - to create a new, collaborative environment (Rayon & Canabal, 2007).

Critics of this environment claim that the transition from classroom to online teaching has resulted, in most cases, in a process of "digitization" of items and has not consistently been accompanied by tools for active and constructive learning. The critics emphasize that, in some cases, the method does not generate the three elements that are considered pillars of the learning process: interaction, reflection and practice (Aguado & Arranz, 2005, Nicholson & Valacich, 2008; Kariuki & Henry, 2010).

From the specific perspective of competence development, Arranz and Aguado (2005) consider that for the nature of these elements the virtual format does not fully allow behavior-environment combination, being restricted the possibilities of interaction that foster the construction of concepts and behaviors associated with these elements. (Rework this sentence into two sentences or more. It is confusing and contains too many thoughts for the reader to follow what you are trying to say. Try not to say so much in one long sentence.)

3. Implementation of e-learning at the Technical University of Madrid

Distance and Open Classroom (ADA) is an initiative involving six universities in the Community of Madrid including the Technical University of Madrid. This project promotes the exchange of subjects through distance education among the participating institutions, creating what is defined as "inter-university classrooms", through which students can access a wide range of subjects that are not offered in their study centers. In this context, the Department of Projects and Rural Development proposed a subject named "Personal Skills: Development". This is a four-month class that is not mandatory. The proposal was aimed at promoting the development of a personal reflexive process about knowledge and individual experience - past and present - in relation to competence elements. Active student involvement in the subject is an essential element for its development.

The general objective of the subject was to develop knowledge and abilities in relation to certain elements of personal behavior that are considered and recognized by the international certification processes as necessary to improve potential employability and to allow future professional activity to be easily addressed.

Its contents are supported on the competence knowledge base designed and implemented by the International Project Management Association (IPMA). This model, with a holistic approach, considers three main scopes: technical, behavior and context skills. These elements combine individual abilities and experience, culminating in a certification process with four levels. The progress process in these elements includes individual learning and continuous improvement (NCB, 2006).

3.1. Methodological Approach

Nineteen elements directly related to individual behavior were selected. Three elements from the technical category and sixteen personal competences were considered to be feasible in the virtual format. The subject was structured with a teaching philosophy based on active and independent learning processes. It is student-centered with teachers participating as managers of learning materials and facilitators of the learning process.

Methodologically, the nineteen elements were grouped into six thematic units: teamwork, leadership, communication, negotiation, conflict and crisis, values appreciation and ethics (annex 1)

Under these premises, a set of virtual activities for personal study were designed, with special emphasis on promoting self-learning, and practice through the development of teamwork. The main objective was to promote the benefits computer networks can provide when developing a flexible teaching model, considering the construction of knowledge through an active position of students instead of a passive reception. It was sought to implement as many tools as were available for teachers at the Moodle platform - evaluation through questionnaires; tasks and teamwork through this platform, etc

The main features of the methodology are summarized in the following figure (see Figure 1). Figure 1 highlights the main elements that are linked together as builder axes of the final process of learning. Each of the axes is described below:

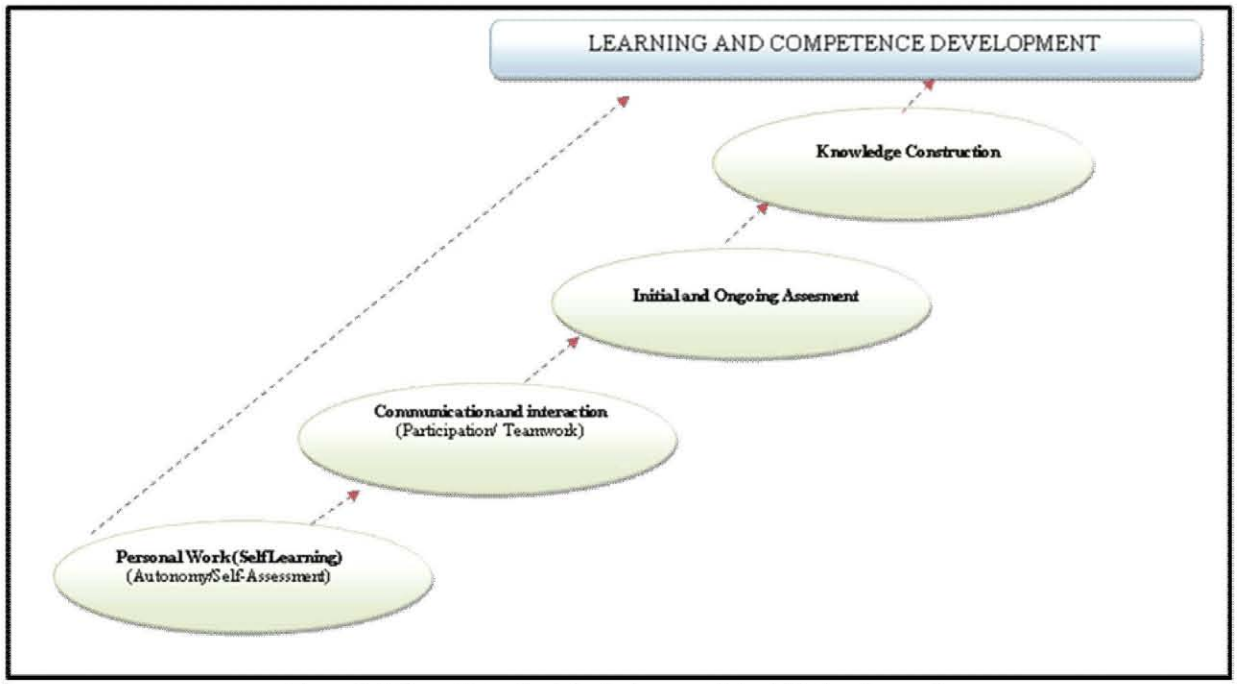

Figure 1: Schematic methodological approach to skills development.
Source: Compiled from the records of the subject

3.2. Personal work: self-learning

Autonomy in learning is the driving force of the learning process for this experience. The goal is for the student to develop a commitment to personal work. The process is characterized by flexibility in the timing and the intensity of study.

Full autonomy was reached for this element. It was essential that students acquired the habit of accessing the platform to study, conduct the activities, and actively participate in the forums, thus taking advantage of all opportunities to interact with teachers, fellow students and teaching materials.

For each of the previously described competence elements, two types of material were generated: (1) required and recommended readings designed to give students the theoretical basis and, (2) an associated questionnaire for each established unit to be developed by students at specific times (day and time).

To promote the active role of students and their involvement in all aspects of the training process they were given access to documents, publications and materials located in the network. In addition, students were provided with planned evaluation activities that were continuous in time and included time constraints so that they were encouraged to work consistently and could follow up on their own learning process.

3.3. Virtual communication and interaction

Another methodological feature was the development of virtual communication and interaction, which is defined as a central dynamic element of the learning process because it is a means for exchange and enrichment of students' experiences and teacher-student relationships.

Communication in this experience was encouraged through three different ways of seeking resolution to questions and guidance for planned activities:1) Electronic forums of generally two types - "general", involving all registered students with the main objective of generating group discussions introduced by teachers; and "specific forums", where teamwork caused interaction between students for the successful development of the final subject

project; 2) "News board" in which faculty staff and a technical secretariat managed all news to report information, either by its importance or new conventions, to all students; 3) Email, the most common tool in the virtual environment through which issues were reported that - for whatever reasons - required a more private interaction between a student and teacher or among students.

Regarding interaction, virtual teamwork was one of the most innovative elements implemented in this subject. It allowed development of completely virtual research work with colleagues from different universities on a theme linked with competence elements from a set of topics. Students could choose topics based on their individual needs. The entire process, from group formation up to delivery of the final report, was accomplished through a Wiki Project created for each group as their own virtual space. This allowed them to store the structure of the work content. In this context and to enhance interpersonal interaction within the group, a forum was opened for each team to facilitate communication processes and development of a virtual work environment.

3.4. Initial and ongoing Assessment.

Another innovative aspect of this methodological approach was the evaluation system. In this proposal two aspects were considered relevant for competence development: ongoing teacher-student assessment and self-evaluation.

Ongoing assessment, understood as the assessment process conducted by the teacher to the student, considered activity monitoring in all activities (questionnaire scores, participation reports on homework, and questionnaires, and forums activity considering quality and continuity of contributions).In addition to the above, the individual involvement of management; development and closure of the teamwork; and the overall result of the work was evaluated.

The process of self-assessment was based on personal assessment of experience and knowledge regarding competence elements associated with the IPMA model. Such assessments take place regularly among professionals opting for certification in project management. This exercise attempts to develop a personal reflection tool that is useful for both teachers and students. This information provides teachers with a starting point of reference for each student with regard to these elements. It also allows students to identify their levels of knowledge and experience so that they can determine areas where they should focus their efforts for development.

3.5. Knowledge Construction: Learning and Development of Skills through Internet

Knowledge construction is considered the main result of the learning process, through developing a constructive and critical approach from all students. Through exercises, self-assessment and teamwork it was hoped that students would commit to a double learning process: individual and collective learning. Individually students should undertake a process of analysis and critical reflection on their personal situation concerning competence elements and the conceptualizations used in this experiment, as well as identify which items are most relevant for their varying professional futures. With this process, students engage in a self-diagnosis that allows them to identify areas of strength and weakness and permits them to focus on or redirect training efforts according to their needs.

By promoting teamwork, students were allowed to develop the skills to function on a virtual network. Beyond the themes that each group developed through this work, the groups were encouraged to strengthen the competence of teamwork, communication, commitment and motivation, and reliability. These factors are all relevant when considering future employability where more and more work is becoming "virtual".

Skills development and knowledge construction was aimed not only at understanding, but also at the assimilation of information. Theoretical foundation (learned individually), the practice of teamwork and self-assessment process are considered the three pillars for knowledge in this experience, the strengthening of skills is also considered an integral part of student behavior.

4. Implementation Outcomes

For this experience, and from the methodological assumptions made, a virtual space was built in which materials, assessment tools and communication means necessary for development of the previously described course were stored. The goal was to guarantee the quality of knowledge that would be delivered.

Initial enrollment of 60 students was divided into five major training areas: social sciences (psychology, anthropology, journalism, communication, sociology, and occupational therapy), economics, engineering, medical sciences and health, and physics (see figure 2).

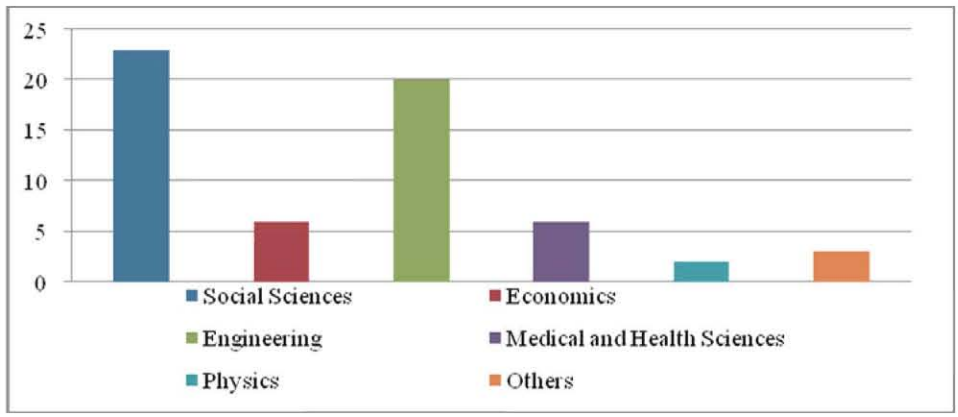

Figure 2: Distribution of students enrolled in the subject
Source: Compiled from the records of the subject

The heterogeneous distribution of the student group, even with a slight tendency towards social sciences, shows that interest in the development of competence elements cuts across all areas of training. This is seen as an added value in the face of labor market demands. The distribution of students by university was fairly balanced between the participating institutions. The exceptions were the U. Carlos III, which has the lowest tuition, and the UPM, which, as the host university, had more of their own students than the others. Overall results in terms of approval of the course reached 72.9%. With regard to final grades, 66.1% achieved scores between 7 and 10 while 6.7% were in the range limit for approval (see Figure 3).

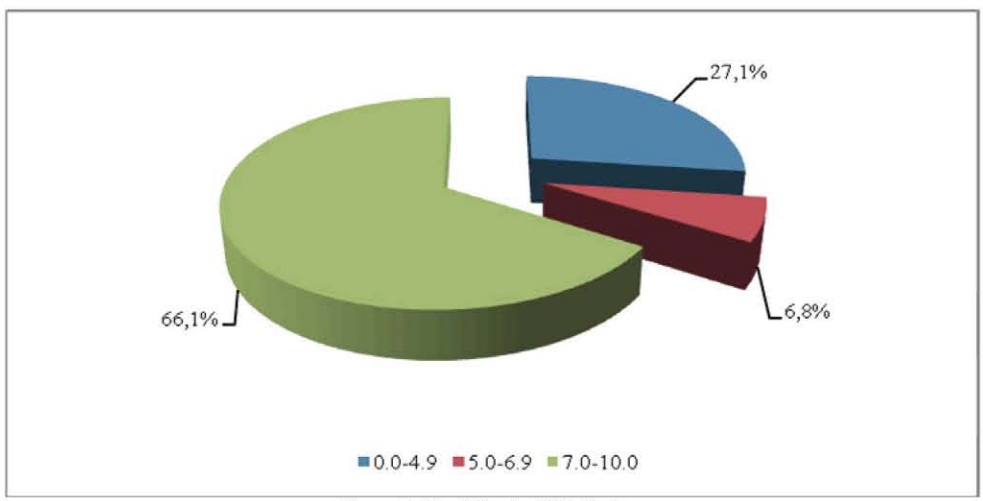

Figure 3: Final Grades Distribution
Source: Compiled from the records of the subject

Participation results were evaluated by three tools: assignments, quizzes, and teamwork. The results were positive with 80% of students successfully completing this requirement.

With regard to competence self-assessment when students are still in training, most students have no experience and declared that their knowledge was rather low on the elements of competition. However, the self-reflection process that generated the exercise was valued positively. This process marked the starting point for each student for future development of these elements.

Questionnaires had a total of seven multiple choice exercises. 68.4% completed more than half of the questionnaires and 14, 3% answered between 0 and 3 questionnaires and did not meet the minimum requirements for the course.

Two indicators were considered for the evaluation of teamwork: (1) quality of the final work delivered, and (2) individual participation in this process. In this regard, 66.7% of those enrolled successfully completed the work with a positive evaluation. Their feelings are indicated in the following comments:

"No doubt the on- line group job done has been quite an experience, complicated, and to which I had to devote much time, but very interesting";

"Relying on others without knowing each other has made us have a high motivation to stay in touch and go every day to check that everything was going according to plan; to stop relying on each other to achieve the same end. ";

"The highlight of the course, in my view, has been the realization of teamwork, since all the knowledge learned by having the subject was put into practice - not only a theoretical approach."

Likewise, students' assessments about their experience learning about competence elements were measured through a survey upon completion of the course. Student responses were positive on the conceptualization of the elements of competence. One said that: *"Knowing that we could ignore skills and learn about them through the pace of the course - through theory and practice - helped me to understand them better."*

Results in terms of qualifications and assessments suggest the positive results of its implementation for competence development. The main findings are detailed below.

5. Conclusions

The implementation of this pilot experience provides evidence that nowadays information technology and communication technologies have opened up new spaces and forms of learning that can (and are) implemented in the area of competence development towards initial formation and continuous professional development.

Results showed that most students had many competence developments but conceptualization and analysis had not been identified and, therefore, not properly developed. This was one of the aspects most valued by students. They stress the added value of knowing the conceptual base associated with each of the competence elements, as well as the work of self-reflection done individually and then shared with a critical approach with peers and teachers in a process of knowledge enrichment. This is in addition to the exercise of distinguishing the elements that allow them to identify the advantages of each element in favor of individual professional development.

This experience has identified two processes in learning about competence elements: (1) the assimilation of knowledge understood as the integration of the theoretical definition of a concept, and (2) the reflection on them to improve through experience, learn through practice and apply it in the future by moving from a learning process to a process of meaningful learning.

As for learning techniques, those with better results were questionnaires, participation in thematic unity and teamwork developed through the WikiProject. However, techniques such as videoconferences — which by their nature are linked to virtual platforms — did not have the desired effect and resulted in low participation in all three cases even though students could access the conferences later as stored videos. This is one of the points to consider for improvement in a new implementation because it is felt that the students' participation in these activities is an enriching element of the experience since it encourages "interaction" among students and professors. Another aspect to be considered for improvement is continued involvement and commitment of all students with regard to

teamwork. This was achieved partly through online questionnaires. However there was a lower rate of students that were not kept informed about all activities. This had a clear detrimental effect on their learning.

Distribution of students suggests that development of these elements is not exclusive to a professional area. However, there is a cross-claim that it is important to know and learn about these elements from a wide range of careers.

As an innovative experience, design and implementation of this subject opens a new space for the development of competences and a new learning strategy in which a student's more active role allows knowledge to be integrated two ways: intellectually and through their own experience.

Finally, it seems relevant to note that the implementation of Bologna is a long-term transformation. This process will leave some generations at an intermediate stage in formation if they have not fully integrated these competence elements. The flexibility afforded by the e-learning platform positions this instrument as a complementary tool to traditional training and encourages the development and strengthening of competence towards a full and comprehensive implementation of the European Higher Education Area.

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Source: NCB 3.0 (International Project Management Association, 2006)

Annex 1: Competence elements definitions.

Unit 1: Teamwork	
Teamwork	Knowledge related to teamwork and developing the ability to work as a team; integrate and collaborat actively in achieving common goals.
Engagement and Motivation	Knowledge of commitment and motivation through a positive attitude; responsible and enthusiasti transmitting it to others.
Efficiency	Ability to use time and resources in a profitable way to produce the agreed deliverables and meet th expectations of the parties involved.
Creativity	Ability to think and act in an original and imaginative way when solving problems.
Results orientation	Focus attention on key objectives for optimal results in the development process.
Unit 2: Leadership	
Leadership	Knowledge of how to develop leadership skills for individual and team performance.
Self control	Individual capacity to incorporate a systematic and disciplined approach to address daily work, changes i requirements and stressful situations.
Assertiveness	Ability to express views with the necessary authority to ensure effective communication with the proje team and stakeholders so that decisions affecting the project are made with full knowledge of the consequences.
Unit 3: Communication	
Information and Documentation	Knowledge of Information and Documentation in order to complete modeling, collection, selectio storage and retrieval of data from a project.
Communication	Knowledge required to develop the ability to communicate effectively in written form. Conve information accurately, consistently and clearly over the network.
Openness	Capacity to welcome the contributions of others and accept criticism constructively.
Unit 4: Negotiation	
Consultation	Capacity refers to the exchange of views. Thinking and listening, presenting solid, structured arguments.
Negotiation	Process by which parties can resolve disputes related to the project to reach a mutually satisfactor solution.
Reliability	Ability to meet agreed commitments and to demonstrate accountability, proper behavior, discipline an confidence.
Unit 5: Conflict and Crisis	
Conflict and Crisis	Ability to manage conflicts and crises that may arise between the various parties involved in the project.
Relaxation	Ability to defuse tension in difficult situations, eliminate stress and bring new energy to a group of peop when needed.
Unit 6: Values Appreciation	
Values Appreciation	Capacity to perceive the intrinsic qualities of others and understand their views.
Ethics	Ethical conduct or ethical behavior including professional ethics, integrity and solidarity.